

The Cowrie Fauna of Penrith Island

(Mollusca : Gastropoda)

BY

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(1 Text figure)

(G. Houston collected the cowries and described their habitat; the Schilders examined the shells and animals.)

PENRITH ISLAND is situated about 70 kilometers off Mackay, Queensland, at a distance of about 37 kilometers from the inner border of the Great Barrier Reef so that the island is almost half way to its outer fringe.

The island extends about three kilometers from West to East. Along its sheltered South coast there is a typical coral reef (see map) the profile of which is shown in the diagram; the letters A to H indicate the following zones:

- A = land formation
- B = sand overgrown with scrub
- C = beach
- D = sand and broken patches of dead coral; pools from 15 centimeters to one meter deep
- E = dead coral
- F = live coral, mostly soft
- G = live hard coral edge at zero low tide (outer fringe)
- H = deep water

The limit between D and E is about 1.5 m, that between E and F about 60 cm above zero.

The mean temperature of the sea surface is about 20° C in August and almost 27° C in February, according to SCHOTT (1935).

COLLECTED SPECIES

The following list contains the species of the superfamily Cypraeacea collected in 24 collecting tides spread over the past three years. The first column indicates the total number of specimens of rather rare species collected in the entire period (the + sign indicates frequent species

represented by not counted specimens); the second column gives the number of specimens collected on a three weeks trip to Penrith Island in August and September 1962, which were packed in cotton wet by alcohol and put in plastic bags so that the animals were still soft after being in transit for three months and suitable for anatomical dissection.

CYPRAEIDAE

Cypraeinae

3	—	<i>Luria isabella</i> (LINNAEUS, 1758)
+	56	<i>Mauritia eglantina</i> (DUCLOS, 1833)
+	46	<i>Lyncina lynx</i> (LINNAEUS, 1758)
+	20	<i>Lyncina vitellus</i> (LINNAEUS, 1758)
4	1	<i>Lyncina carneola</i> (LINNAEUS, 1758)

Nariinae

+	44	<i>Monetaria annulus</i> (LINNAEUS, 1758)
+	35	<i>Monetaria moneta</i> (LINNAEUS, 1758)
1	—	<i>Erosaria labrolineata</i> (GASKOIN, 1848)
+	22	<i>Erosaria caputserpentis</i> (LINNAEUS 1758)
+	49	<i>Erosaria erosa</i> (LINNAEUS, 1758)
13	—	<i>Staphylaea limacina</i> (LAMARCK, 1810)

Cypraeovulinae

+	122	<i>Erronea erroneus</i> (LINNAEUS, 1758)
2	2	<i>Erronea cylindrica</i> (BORN, 1778)
+	19	<i>Erronea caurica</i> (LINNAEUS, 1758)
9	—	<i>Erronea listeri</i> (GRAY, 1825)
1	—	<i>Palmadusta punctata</i> (LINNAEUS, 1771)
30	—	<i>Palmadusta asellus</i> (LINNAEUS, 1758)

+	22	<i>Palmadusta clandestina</i> (LINNAEUS, 1767)
+	30	<i>Palmadusta gracilis</i> (GASKOIN, 1848)
15	—	<i>Palmadusta minoridens</i> (MELVILL, 1901)
18	—	<i>Bistolida pallidula</i> (GASKOIN, 1848)
5	—	<i>Bistolida hirundo</i> (LINNAEUS, 1758)

AMPHIPERATIDAE

Amphiperatinae

+	20	<i>Calpurnus verrucosus</i> (LINNAEUS, 1758)
1	—	<i>Amphiperas ovum</i> (LINNAEUS, 1758)

The frequently encountered species evidently prefer certain zones of the reef:

1. The callous *Monetaria annulus*, *M. moneta*, and *Erosaria caputserpentis* live mostly exposed in crevices from the beach to 1.5 m above zero (zones C and D); *M. annulus* could have been collected well in the thousands. *M. moneta* is slightly less abundant.

2. The large *Mauritia eglantina*, *Lyncina lynx*, and *L. vitellus* live under stones and corals, almost from the beach to 60 cm (zones D, E, and F).

3. The mostly less heavy *Erosaria erosa*, *Erronea erronea*, *Erronea caurica* and *Palmadusta gracilis* as well as the minute *Trivirostra oryza* (LAMARCK) which belongs to the Lamellariacea, live from 1.5 m to the outer fringe (zones F and G).

4. *Palmadusta clandestina* has been found only in one hollow under dead coral (zone E, marked by a small circle on the map), and *Calpurnus verrucosus* has been found in one area only on soft coral resembling a flat cabbage (zone F, marked with * on the map).

Among true cowries (Cypraeidae) the 22 collected species represent scarcely more than one third (39%) of the 56 species occurring along the coast of Queensland and on the neighboring islands. The most surprising fact is that *Cypraea tigris* LINNAEUS, 1758 which is common in most parts of the Great Barrier Reef, never was found on Penrith Island, and there is no evidence of it ever having been there. The absence of *Erronea xanthodon* (SOWERBY, 1832) is also remarkable as it is rather frequently encountered along the coast of Queensland and New South Wales.

THE TABLES

Table 1 contains the following nine quantitative characters:

Shell: L = length of the shell in millimeters

BL = maximum breadth in per cent of length

LT = closeness of labial teeth expressed by letters (with decimals expressing the exact value between two letters), according to SCHILDER, 1958.

CT = closeness of columellar teeth (the anterior terminal ridges excluded) treated in the same way

Radula: r/12 = number of rows in dozens (and decimals of dozens)

m/L = relative breadth of the median

dr/L = relative length of the radula; all figures concerning radulae have been calculated according to SCHILDER, 1963

Animal: ♀ % = sex ratio (females in percent of the sum of both sexes)

P/L = Length of the penis in per cent of the length of the shell

Each character comprises two columns: the left column indicates the average character of the specimens collected at Penrith Island (P. I.) in 1962, the number of which has been given in the species list above; the right column indicates the average character in comparable populations from other localities (oth.) named in the right margin of Table 1; most figures refer to the sum of various localities in Vitilevu, Fiji Islands, from where we have received large numbers of specimens containing the well preserved animal from Mr. Walter O. Cernohorsky, Vatukoula, Fiji (the 141 *Erosaria caputserpentis* came from a single locality, i.e. St. Annes-on-Sea on the South coast of Vitilevu); species not occurring in Fiji in satisfactorily large numbers have been compared with populations from East Australia (*Palmadusta gracilis*), New Britain (*Calpurnus verrucosus*), the entire Pacific (*Palmadusta clandestina*), or Kenya (*Erronea caurica*).

These two columns for each character are connected with the symbols >, <, or =, indicating that the mean of the Penrith specimens is distinctly larger, or distinctly smaller than, or very similar to identical with the mean of specimens from the other locality.

Table 2 enumerates several variable qualitative characters of shells in most species; based on former studies (SCHILDER, 1952, p. 55) they have been classified in six classes as indicated in the columns 1 to 6.

Table 3 indicates the average development of these qualitative characters of shells, expressed in classes with one decimal; the central pair of columns compares the mean of the shells from Penrith Island (P. I.) with that from other localities (oth.) mentioned in Table 1, whereas the two right pairs of columns show the sexual differences at Penrith Island and those in the other populations, respectively.

Table 4 shows the sexual differences in four quantitative characters of the shells and in three characters of the radulae; in each species, the first line refers to the specimens from Penrith Island, the second line to the comparable population. Whenever the mean of the two sexes greatly differs from the mean indicated in Table 1, this fact may be explained by the impossibility to state the sex in many extreme specimens.

The symbols $>$, $<$, and $=$ are used in Tables 3 and 4 in the same manner as in Table 1.

COMPARISON OF POPULATIONS

It is surprising that the average length of the shells obtained from Penrith Island distinctly exceeds that of other populations (Table 1): at P. I. all species grow larger than elsewhere, *Mauritia eglantina* excepted, which is smaller (*Lyncina vitellus* seems to be as large as in Fiji).

The relative breadth does not deviate in such a distinct direction: though many species are less broad in P. I., according to their greater length, the two *Lyncina* and some Cypraeovulinae are broader in P. I. than in other localities.

The relative closeness of teeth also does not show any general trend at P. I., though there are significant differences in several species; there is also no parallelism in local relative closeness between the labial and columellar teeth.

The ecotypes (called morphae by J. Huxley) distinguished in *Monetaria* have not been tabulated in this paper. If we express the relative tendency to $H:A:Q$ in *M. annulus* and $S:C:R:E:M$ in *M. moneta* (see SCHILDER, 1952, pp. 99, 104) in tenths (1 = 10%, 0 = less than 5%, o = less than 1%, — = absent), the formulae of Penrith Island are 0:9:1 and 2:o:7:0:0, those of Fiji populations 2:5:3 and 0:2:5:2:o respectively; in both areas A and R predominate, but in the small area of P. I. they predominate more distinctly; besides in *M. moneta* of P. I. the ecotype R tends to the large flattened S , in Fiji to the small callous ecotypes C and E .

There is no general tendency in qualitative characters of the shells (Table 3), neither in callosity (*Monetaria moneta* and *Erosaria erosa* are less callous, but *Erronea erronea* is much more callous in P. I. than in Fiji) nor in the various characters in color and markings in which class 1 always designates the palest and least marked shells, class 6 the darkest and most marked specimens.

However, in the radula (Table 1) the Penrith fauna consistently differs from the comparable populations as follows: the number of rows ($r/12$) is always larger or at least equal (3 species), but never smaller; the size of the median (m/L) is also greater in most species, rarely equal (2 species), and only in *Palmadusta clandestina* smaller; therefore the whole radular ribbon (dr/L) is relatively longer in all species collected at Penrith Island than in the populations from elsewhere, without any exception! This parallelism in the development of the radula in the eleven species of Cypraeidae is most interesting; as the tendency to become longer and mostly

broader is apparent in all cowrie species collected at Penrith Island it must be caused by environmental peculiarities.

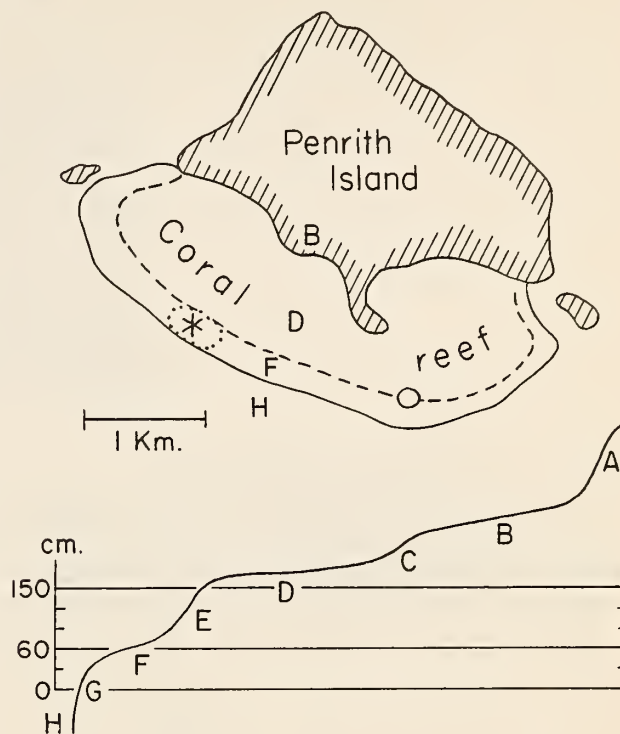


Figure 1: Outline map of Penrith Island and profile of shore line.

The differences in the sex ratio (Table 1) should be regarded as random only, as the mean of all percentages of females in P. I. (54%) is practically identical with that in foreign populations (52%).

The relative length of the penis (P/L in Table 1) is very interesting; in the seven first listed species, which belong to the subfamilies Cypraeinae and Nariinae, the penis is distinctly shorter in the males from P. I. than in those from Fiji; this difference cannot be explained as caused by different preservation of the animals, as in the four remaining species, belonging to the subfamily Cypraeovulinae, the penis, in contrast, is longer in P. I. males (except in *Palmadusta clandestina*, in which the greater length of the penis in specimens from the entire Pacific may be random only, as we could examine only six males); we presume that there may be a different reaction of species to local influences, according to their belonging to different subfamilies! Besides, the figures of both columns confirm the fact that the penis of Cypraeovulinae is relatively shorter than that of the two other subfamilies (SCHILDER, 1961, p. 209).

Table 1

Species	L		BL		LT		CT	
	P. I.	oth.	P. I.	oth.	P. I.	oth.	P. I.	oth.
<i>Mauritia eglantina</i>	49.4	<51.2	55.6	<58.7	t.9	< u.4	u.1	> t.5
<i>Lyncina lynx</i>	41.1	>38.2	58.3	=58.2	o.6	= o.5	o.2	= o.4
<i>Lyncina vitellus</i>	47.7	=47.7	64.4	>63.2	n.7	< o.3	o.6	< p.2
<i>Monetaria annulus</i>	23.9	>19.8	68.2	<71.0	g.4	= g.3	f.8	= f.5
<i>Monetaria moneta</i>	25.4	>20.8	71.4	<72.5	g.5	= g.4	h.0	= h.3
<i>Erosaria caputserpentis</i>	31.0	>25.7	70.8	<74.8	k.3	> i.8	h.7	= h.8
<i>Erosaria erosa</i>	33.0	>31.7	59.0	<60.9	l.7	> l.3	i.5	= i.7
<i>Erronea erronea</i>	23.4	>19.5	57.2	>55.4	h.6	< i.4	k.6	< l.6
<i>Erronea caurica</i>	35.8	>32.7	52.4	<56.8	k.9	> k.2	l.2	< n.5
<i>Palmadusta clandestina</i>	15.9	>14.6	62.0	>58.8	p.5	< q.6	p.4	< p.8
<i>Calpurnus verrucosus</i>	18.3	>17.6	59.9	=60.2	n.8	> n.3	o.1	= n.8
<i>Palmadusta gracilis</i>	22.2	>20.3	62.6	<63.9	o.4	< p.2	—	

COMPARISON OF SEXES

The well preserved animals of the cowries collected at Penrith Island allow confirmation of previous statements on sexual differences (SCHILDER, 1961, 1962, 1963). The figures concerning "other areas" have been added

to control the tendency of differences in P. I., indicated in the columns and lines of Tables 3 and 4, respectively; these figures are based on much more numerous specimens and anticipate the results to be published in a future paper on the Fiji cowries.

Table 2

species	character	1	2
<i>Mauritia eglantina</i>	dorsal markings	pale yellow	yellow
	lacunae interrupting the longitudinal striae	obsolete	scarce
<i>Lyncina lynx</i>	dark brown spire blotch	absent	obsolete
	dorsal bluish grey layer	absent	at margins
<i>Lyncina vitellus</i>	dorsal color	pale fulvous	fulvous brown
<i>Monetaria annulus</i>	dorsal orange ring	absent	short traces
<i>Monetaria moneta</i>	LT (labial) : CT (columellar teeth) *	both short	produced: short
	dorsal orange ring	absent	short traces
<i>Erosaria erosa</i>	dorsal golden suffusion	absent	obsolete
	right margin and rim	rounded; pitted	narrow; pitted
	large blotch on outer lip	absent	obsolete
	id. on columellar margin	absent	obsolete
<i>Erronea erronea</i>	fawn basal striae	absent	obsolete
	base and aperture	flat; very wide	flat; wide
	dorsal zones	absent	obsolete
	dorsal central blotch	absent	obsolete
	right anterior spot	absent	obsolete
	left anterior spot	absent	obsolete
<i>Erronea caurica</i>	color of base and margins	white	hardly yellowish
	dorsal central blotch	absent	obsolete
<i>Palmadusta gracilis</i>	dorsal central blotch	absent	obsolete

* see SCHILDER, 1962, p. 100

Table 1

r/12		m/L		dr/L		♀ %		P/L		oth.=
P. I.	oth.	P. I.	oth.	P. I.	oth.	P. I.	oth.	P. I.	oth.	
14.9>	12.0	8.0=	8.0	13.2>	11.1	53 >	49	39.3<	52.7	Fiji
21.1>	17.1	10.0>	9.1	12.8>	8.9	39 <	45	42.1<	48.2	Fiji
21.3>	18.8	9.7>	8.8	12.7>	10.3	45 >	38	43.0<	43.8	Fiji
10.9>	10.3	10.2>	9.8	10.8>	8.7	59 <	64	43.8<	53.5	Fiji
8.0=	8.1	11.7>	9.8	9.9>	8.0	62 =	60	41.0<	43.3	Fiji
9.4=	9.5	10.8>	9.6	9.3>	8.3	41 <	51	58.4<	67.4	St. Annes
10.3>	9.9	9.3>	7.8	10.4>	8.3	41 =	44	42.4<	50.3	Fiji
8.0=	8.1	11.7>	9.8	9.9>	8.0	62 =	60	31.5>	28.7	Fiji
9.2>	8.6	11.1>	9.4	9.9>	7.8	68 >	57	29.2>	28.6	Kenya
10.4>	9.0	9.2<	9.8	5.4>	4.6	74	?	24.0<	30.8	Pacific
7.6=	7.7	10.9=	11.1	7.7>	7.4	70 >	50	35.6>	28.9	E. Australia
—	—	—	—	—	—	—	—	—	—	New Britain

The shells of females (Table 4) are distinctly longer than those of males, both in P. I. and in other areas, excepting the two species of the genus *Erronea*, in which they are of equal size or even smaller.

The female shells are also generally broader than those

of the males, though one might expect them to be more slender, since larger cowries generally are less broad than smaller shells. The greater breadth of females can be noted in all species, both from P. I. and from other areas, except in *Palmadusta gracilis* and in the most callous

Table 2

3	4	5	6
fulvous brown	red-brown	dark brown	blackish brown
rather scarce	equal to striate areas	numerous	predominant
small	rather large	large	very large
half the dorsum fawn	thin, transparent dark fawn	thick brown	very thick blackish brown
pale yellow	yellow	orange	rich reddish
produced: one terminal wart	subnodose : 1-2 terminal warts	both nodose	both acutely nodose
pale yellow	yellow	orange	rich reddish
indistinct	distinct	thick, orange	very thick, orange
swollen, pitted	swollen, pits covered	very callous	extremely callous
small	rather large	large	very large
small	rather large	large	very large
scarce	distinct, pale	distinct, saturate	very rich
subconvex; wide	convex, less wide	convex; narrow	callous; narrow
indistinct	pale	well marked	saturate
small	rather large	large	very large
small	rather large	large	very large
small	rather large	large	very large
yellowish white	pale yellow	rich yellow	yellowish orange
small	rather large	large	very large
small	rather large	large	very large

species, *Monetaria moneta* and *Erosaria caputserpentis*.

There is evidently no sexual difference in closeness of teeth, as evident differences observed at P. I. seem to be random, annulled by equal numbers in other areas; the only possible difference is in the labial teeth of *Palmadusta gracilis* and in the columellar teeth of *P. clandestina*, in both of which the female teeth seem to be closer together.

The ecotypes in *Monetaria* (see above) seem to indicate that in male *M. annulus* the ecotype *Q* is more frequent than in females (P. I. - ♀ 1:9:—, ♂ 0:9:1; Fiji-

♀ 1:6:3, ♂ 1:4:5); in *M. moneta* from P. I. no sexual difference becomes apparent, while in Fiji the *C* of females is often replaced by *E* in males (♀ 1:4:3:2:0; ♂ 1:0:4:5:0).

In the same way, sexual differences in the basal ribs of *Monetaria moneta* are absent in P. I. though distinct in Fiji (Table 3; see also SCHILDER, 1962, p. 101). Sexual differences in color and markings are irregularly scattered, but in *Lyncina* the females seem paler, while the *nebrites*-like basal striae of *Erosaria erosa* prevail in this sex.

Table 3

species	character	mean	P. I.		other	
		P. I. oth.	♀	♂	♀	♂
<i>Mauritia eglantina</i>	dorsal markings	3.6>3.3	3.7>3.4	3.3=3.3		
	dorsal lacunae	3.4=3.4	3.4=3.3	3.3=3.4		
	spire blotch	3.4<4.2	3.5=3.3	4.3=4.2		
<i>Lyncina lynx</i>	grey layer	3.0<3.6	2.4<3.4	3.5<3.7		
<i>Lyncina vitellus</i>	dorsal color	3.9=3.8	3.8<4.0	3.6<3.8		
<i>Monetaria annulus</i>	orange ring	4.6<4.9	4.5<4.9	4.9=5.0		
<i>Monetaria moneta</i>	basal ribs	2.4<3.0	2.1=2.0	2.6<3.9		
	orange ring	2.3<2.7	1.9<2.2	2.5<3.2		
	golden suffusion	3.0>1.0	2.2<2.6	1.0=1.0		
<i>Erosaria erosa</i>	right margin	2.8<3.1	3.0=2.8	3.0=3.1		
	labial blotch	3.8=3.9	3.8=3.8	3.9=4.1		
	columellar blotch	4.6=4.6	4.6=4.7	4.7=4.6		
	basal striae	2.8>2.6	3.1>2.6	2.9>2.4		
<i>Erronea erronea</i>	base, aperture	3.1>2.2	3.2>2.9	2.2=2.3		
	dorsal zones	4.6>3.6	4.6=4.7	3.5<3.8		
	dorsal blotch	4.3>2.8	4.3=4.5	3.2>2.8		
	right spot	1.1<3.0	1.1=1.2	3.1=3.0		
	left spot	1.0<1.5	1.0=1.0	1.6=1.6		
	basal color	3.0<3.6	3.0=3.0	3.6=3.5		
<i>Erronea caurica</i>	dorsal blotch	2.1<2.5	2.0<2.3	2.4=2.4		
<i>Palmadusta gracilis</i>	dorsal blotch	3.0=3.0	2.9=3.1	3.0=2.9		

The radula (Table 4) of females contains almost invariably more numerous rows than that of the males, while the median tooth is less broad in females, the two species of *Lyncina* excepted; but these contrary characters do not cancel each other out, as the radular ribbon of females is shorter in all species than the ribbon of males, again the two species of *Lyncina* excepted.

ADDITIONAL REMARKS

The racial characters of the cowries from Penrith Island generally agree with those attributed by SCHILDER & SCHILDER 1952 to the Melanesian subspecies which spread to Queensland. Special East Australian subspecies should

be rejected taxonomically; the only exceptions seem to be *Palmadusta gracilis macula* (ANGAS, 1867) and *Erosaria caputserpentis caputanguis* (PHILIPPI, 1849); the former is restricted to Queensland and New South Wales, while the latter is a typical "cline" as its characters are developed best at its southern border in the Sydney area, while such specimens become more and more rare among farther Northern populations; at Penrith Island few shells exhibit some characters reminiscent of *E. c. caputanguis*.

The single examined *Lyncina carneola* is a female of 44.5 mm with dark margins adorned with six paler low pustules on the right side. The only *Erosaria labrolineata*

Table 4

		L		BL		LT		CT		r/12		m/L		dr/L	
		♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂
<i>Mauritia eglantina</i>	P. I.	50.1	>49.1	56.1	>54.8	t.9	= u.0	u.0	= u.1	14.3	>13.2	7.6	< 8.4	12.9	<13.7
	Fiji	51.6	>50.4	59.5	>58.0	u.4	= u.4	t.5	= t.5	12.7	>11.4	7.4	< 8.5	10.7	<11.5
<i>Lyncina lynx</i>	P. I.	43.9	>39.4	58.6	>58.1	o.5	= o.7	o.1	= o.4	22.6	>20.7	9.9	=10.0	13.5	>12.5
	Fiji	41.0	>37.0	58.8	>57.5	o.5	= o.5	o.5	= o.3	17.4	>17.0	9.2	= 9.1	8.9	= 8.9
<i>Lyncina vitellus</i>	P. I.	48.4	>47.1	65.9	>63.1	n.8	= n.6	o.9	> o.3	21.9	>20.8	10.2	> 9.3	13.5	>12.0
	Fiji	49.0	>47.2	64.1	> 62.3	o.4	= o.2	p.1	= p.2	18.1	<19.4	9.1	> 8.6	10.2	=10.2
<i>Monetaria annulus</i>	P. I.	24.0	=24.0	68.8	>68.4	g.5	= g.4	g.0	= f.7	11.2	>10.4	10.1	<10.4	10.3	<11.0
	Fiji	20.1	>18.9	71.0	>70.4	g.5	= g.2	f.6	= f.4	10.9	> 9.0	9.2	<11.0	8.6	< 9.2
<i>Monetaria moneta</i>	P. I.	26.3	>25.6	70.7	=70.8	h.0	> g.2	h.0	= h.2	10.2	> 9.6	10.4	<10.6	9.2	<10.0
	Fiji	20.7	>19.6	75.1	>73.0	g.5	= g.5	h.0	= h.2	9.2	> 8.9	8.7	< 9.8	8.1	< 8.8
<i>Erosaria caputserpentis</i>	P. I.	31.9	>30.4	70.3	<71.1	k.6	> k.1	h.9	= h.6	9.9	> 9.1	9.7	<11.7	8.6	< 9.8
	St. Ann.	26.0	>25.2	75.0	=74.7	i.8	= i.9	h.8	= h.7	9.9	> 9.3	9.0	<10.1	7.8	< 8.7
<i>Erosaria erosa</i>	P. I.	33.4	>32.7	59.6	>58.6	l.4	< 1.9	i.3	= i.6	10.9	>10.0	8.6	< 9.8	9.9	<10.7
	Fiji	32.8	>31.9	60.8	>60.1	l.5	= 1.2	i.6	= i.8	10.8	> 9.4	7.2	< 8.5	8.0	< 8.5
<i>Erronea erronea</i>	P. I.	23.5	=23.3	57.6	>56.6	h.6	= h.7	k.5	< k.9	8.2	> 7.7	10.8	<13.2	9.3	<10.9
	Fiji	19.6	=19.9	55.6	>54.6	i.4	= i.4	l.6	= 1.6	8.2	= 8.2	9.3	<10.5	7.5	< 8.8
<i>Erronea caurica</i>	P. I.	35.2	<37.2	52.9	>51.5	k.6	< 1.7	l.1	= 1.5	9.3	> 8.7	10.3	<12.8	9.6	<10.7
	Kenya	33.0	<33.3	57.2	>56.6	k.2	= k.3	n.5	= n.7	8.9	> 8.3	8.0	<11.1	6.8	< 8.8
<i>Palmadusta clandestina</i>	P. I.	16.3	>15.4	62.0	>61.6	p.1	< p.8	p.6	> p.2	10.6	> 9.5	9.2	= 9.2	5.4	= 5.5
	Pacific	(16.5)	14.7	(59.0)	59.0	q.0	= p.9	r.0	> q.1	(8.5)	9.2	(10.5)	8.8	(5.0)	4.6
<i>Palmadusta gracilis</i>	P. I.	18.4	>18.0	59.7	<60.3	o.0	> n.2	o.2	= n.8	8.3	> 6.2	10.4	<12.1	7.1	< 9.2
	Austral.	17.4	>16.9	61.0	=61.0	m.8	>m.2	n.5	= n.7	7.7	= 7.8	10.7	<11.5	6.6	< 8.2

recalls the shell named *maccullochi* by IREDALE in 1939. Among the 13 *Staphylaea limacina* seven shells are smooth (*facifer* IREDALE, 1935) and six are pustulose (*monstrans* IREDALE, 1935). The *Erronea erronea* connect the typical *E. coerulea* (SCHRÖTER, 1804) with *E. mageronnes* (IREDALE, 1939), a callous ecotype occurring at various localities in Queensland. The *E. caurica* mostly recall the shell figured 1939 by IREDALE as *thema*. Two *Palmadusta gracilis* exhibit ferruginous striae outside the posterior labial teeth, as it often occurs in specimens from Queensland. *Bistolida pallidula* belongs to the New Caledonian race *rhinoceros* (SOVERBIE, 1865) and not to the more Eastern *summersi* SCHILDER, 1960, as the closeness of teeth is pn; the radula of the Penrith specimen shows five denticles on the anterior margin of the median (which is destitute of basal teeth) and four denticles each on the admedian and the laterals, as it is in *B. coxeni* (Cox) in contrast to *B. quadrimaculata* (GRAY, 1824).

SUMMARY

An exact analysis of the characters of shells and animals observed in the two sexes of eleven cowrie species collected at Penrith Island off Mackay, Queensland, shows interesting differences between this restricted population

and cowries mostly coming from the zoogeographically adjacent, but more tropical Fiji Islands. There is a distinct parallelism in several characters of shells and radulae in all species or in taxonomical groups of species, which may be caused by influence of the habitat.

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